

5 CLAIMS:

1. In a two stage process of injection stretch blow molding polypropylene to form a container, wherein a first stage comprises forming a preform article and a second stage comprises reheating and blow molding the preform article to form a container, the first stage comprising the steps of:

10 (a) providing a chemical composition comprising polypropylene, said chemical composition having a melt flow index in the range of between about 6 and about 50 grams/10 minutes, according to ASTM D 1238;

(b) injecting said chemical composition into a mold at a fill rate of greater than about 5 grams of chemical composition per second;

15 (c) forming said chemical composition into a preform article, said preform article having a closed end connected to a side wall, said side wall having a maximum thickness of less than about 3.5 mm; and

(d) removing said preform article from said mold.

20 2. The process of claim 1 further comprising the steps of:

(e) reheating said preform article; and

(f) stretch blow molding said preform article to form a container.

3. The process of claim 1 wherein said side wall thickness of said preform
25 article is between about 1.5 mm and about 3.5 mm.

5 4. The process of claim 1 wherein said injection step (b) provides said chemical composition into said mold at a fill rate of about 5 - 22 grams/second.

 5. The process of claim 1 wherein said chemical composition comprises an ethylene/propylene copolymer.

10 6. The process of claim 1 wherein said chemical composition further comprises a nucleating agent.

 7. The process of claim 6 wherein said nucleating agent comprises a
15 dibenzylidene sorbitol compound (DBS), or a derivative thereof.

 8. The process of claim 6 wherein said nucleating agent comprises sodium 1,3-0-2, 4-bis(4-methylbenzylidene) sorbitol and derivatives thereof.

20 9. The process of claim 6 wherein said nucleating agent comprises sodium benzoate and derivatives thereof.

 10. The process of claim 6 wherein said nucleating agent comprises 1,2-cyclohexanedicarboxylate salts and derivatives thereof.

25 11. The process of claim 6 wherein said nucleating agent comprises aluminum 4-*tert*-butylbenzonate and derivatives thereof.

12. The process of claim 6 wherein said nucleating agent comprises metal salt(s) of cyclic phosphoric esters and derivatives thereof.

13. The process of claim 6 wherein said nucleating agent comprises bis(3,4-
10 dialkylbenzylidene) sorbitol acetal or derivatives thereof.

14. The process of claim 6 wherein said nucleating agent comprises 1,3-O-2,4-bis(3,4-dimethylbenzylidene) sorbitol or derivatives thereof.

15 15. The process of claim 6 wherein said nucleating agent comprises disodium bicyclo[2.2.1]heptanedicarboxylate or derivatives thereof.

16. The process of claim 1 wherein said chemical composition comprises a at least one species of polypropylene homopolymer.

17. The process of claim 1 wherein said chemical composition comprises a polypropylene random copolymer.

18. The process of claim 1 wherein said chemical composition comprises a
25 polypropylene block copolymer.

5 19. The process of claim 2 wherein said injection step (b) employs a gate in
operable connection to said cavity mold, further wherein said gate provides a diameter
between about 1.5 mm and about 3.8 mm.

10 20. The process of claim 2 wherein said stretch blow molding step (f) is repeated
successively in a manufacturing operation at a rate of container production of greater
than about 900 containers per hour per mold.

15 21. The process of claim 2 wherein said stretch blow molding step (f) is
repeated successively in a manufacturing operation at a rate of container production of
at least about 1200 containers per hour per mold.

20 22. The process of claim 2 wherein said blow molding step (f) is repeated
successively in a manufacturing operation at a rate of container production of at least
about 1500 containers per hour per mold.

23. A preform article formed by employing the process of claim 1.

24. A container formed by employing the process of claim 2.

25 25. The process of claim 2 wherein said container provides a haze to thickness
ratio expressed as a percent haze/mils of less than about 0.05.

5 26. A process for forming a polypropylene preform article to be used in the manufacture of a container, said process comprising the steps of:

(a) providing a chemical composition comprising in part polypropylene, said chemical composition having a melt flow index in the range between about 13 and about 35 grams/10 minutes, according to ASTM D 1238;

10 (b) injecting said chemical composition into a mold at a fill rate of greater than about 5 grams of chemical composition per second;

(c) forming said chemical composition into a preform article, said preform article having a closed end and a side wall, said closed end being adapted for subsequent second stage reheating and stretch blow molding, said side wall of said preform article
15 having a thickness of less than about 3.5 mm; and

(d) removing said preform article from said mold.

27. The process of claim 26 wherein said mold further comprises a gate for injecting into said mold said chemical composition, further wherein said gate is provided
20 at a diameter of between about 1.5 mm and 3.8 mm.

28. The process of claim 26, wherein said chemical composition further comprises a nucleating agent.

25 29. The process of claim 28 wherein said nucleating agent is selected from the group of agents consisting of: dibenzylidene sorbitol-containing compounds, sodium

5 benzoate, cyclohexanedicarboxylate salts, aluminum 4-*tert*-butylbenzoate, metal salts of phosphoric esters, and derivatives thereof.

30. The process of claim 28 wherein said nucleating agent comprises 1,3-O-2,4-bis(3,4-dimethylbenzylidene) sorbitol (DMDBS) or derivatives thereof.

10 31. The process of claim 28 wherein said nucleating agent comprises disodium bicyclo[2.2.1]heptanedicarboxylate or derivatives thereof.

32. The process of claim 26 wherein said injection step provides said chemical
15 composition into said mold at a fill rate of about 5 - 22 grams/second.

33. The process of claim 26 wherein said wall thickness of said preform article is between about 1.5 and about 3.5 mm.

20 34. The process of claim 27 wherein said gate diameter is about 1.5 mm.

35. The process of claim 26 wherein said fill rate in said step (b) is about 5-11 g/s and said preform side wall thickness is about 2 mm.

25 36. The process of claim 26 wherein said fill rate in said step (b) is about 5-13 g/s and said preform side wall thickness is about 3 mm.

5 37. The process of claim 26 wherein said fill rate in said step (b) is about 5-17 g/s and said preform side wall thickness is about 4 mm.

38. The preform article formed by the process of claim 26.

10 39. The process of claim 26, further comprising the steps of:

(e) reheating said preform article; and

(f) stretch blow molding said preform article to form a container.

40. The container formed by employing the process of claim 39.

15 41. A process comprising the steps of:

(a) providing a chemical composition comprising polypropylene, said chemical composition having an MFI in the range of between about 13 and about 35 grams/10 minutes, according to ASTM D 1238;

20 (b) injecting said chemical composition into a mold at a fill rate of greater than about 5 grams of chemical composition per second;

(c) forming said chemical composition into a preform article, said preform article having a side wall thickness of about 2 mm; and

(d) removing said preform article from said mold.

25 42. The process of claim 41 wherein further comprising the steps of:

(e) reheating said preform article; and

5 (f) stretch blow molding said preform article to form a container.

43. A preform article formed using the process of claim 41.

44. A container formed using the process of claim 42.

10 45. A process comprising the steps of:

(a) providing a chemical composition comprising polypropylene, said chemical composition having an MFI in the range of between about 13 and about 35 grams/10 minutes, according to ASTM D 1238;

15 (b) injecting said chemical composition into a mold at a fill rate of greater than about 5 grams of chemical composition per second;

(c) forming said chemical composition into a preform article, said preform article having a side wall thickness of about 3 mm; and

(d) removing said preform article from said mold.

20 46. The process of claim 45 wherein further comprising the steps of:

(e) reheating said preform article; and

(f) stretch blow molding said preform article to form a container.

25 47. A preform article formed using the process of claim 45.

48. A container formed using the process of claim 46.

49. A process comprising the steps of:

(a) providing a chemical composition comprising polypropylene, said chemical composition having an MFI in the range of between about 13 and about 35 grams/10 minutes according to ASTM D 1238, said chemical composition further comprising a
10 nucleating agent, said nucleating agent comprising at least in part a p-methyl substituted benzaldehyde sorbitol compound or derivatives thereof;

(b) injecting said chemical composition into a mold at a fill rate of between about 5 and about 22 grams of chemical composition per second;

(c) forming said chemical composition into a preform article, said preform article
15 having a wall thickness of between about 2 mm and about 4 mm; and

(d) removing said preform article from said mold.

50. A preform article formed according to the process of claim 49.

20 51. A process comprising the steps of:

(a) providing a chemical composition comprising polypropylene, said chemical composition having an MFI in the range of between about 13 and about 35 grams/10 minutes, according to ASTM D 1238, said chemical composition further comprising a nucleating agent, said nucleating agent comprising at least in part disodium
25 bicyclo[2.2.1]heptanedicarboxylate or derivatives thereof;

(b) injecting said chemical composition into a mold at a fill rate of between about 5 and about 22 grams of chemical composition per second;

- 5 (c) forming said chemical composition into a preform article, said preform article
having a wall thickness of between about 2 mm and about 3.5 mm; and
(d) removing said preform article from said mold.

52. A preform article formed according to the process of claim 51.

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53. The process of claim 51 wherein further comprising the steps of:

(e) reheating said preform article; and

(f) stretch blow molding said preform article to form a container.

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54. A container formed according to the process of claim 53.

5 55. A process comprising the steps of:

 (a) providing a chemical composition comprising polypropylene, said chemical composition having an MFI in the range of between about 13 and about 35 grams/10 minutes, according to ASTM D 1238;

 (b) injecting said chemical composition into a mold at a fill rate of greater than
10 about 5 grams of chemical composition per second;

 (c) forming said chemical composition into a preform article, said preform article having an interior wall surface and an exterior wall surface, said preform article further having a side wall thickness between said interior wall surface and said exterior wall surface, said interior wall surface being profiled along its length, said side wall being
15 between about 2 mm and about 4 mm in thickness; and

 (d) removing said preform article from said mold.